

Scientific Note

EXTIRPATION OF ONE EXOTIC ANT SPECIES BY ANOTHER IN SOUTHERN CALIFORNIA

On 7 March 1989, the junior author discovered an infestation of an exotic ant, *Pheidole teneriffana* Forel in and around Admiral Kidd Park, 2125 Santa Fe Avenue, Long Beach, Los Angeles County, California (Martinez, M. J. 1992. Pan-Pacific Entomol., 68: 153–154). This ant was originally described in 1893 from Teneriffe in the Canary Islands (Forel, A. 1893. Ann. soc. Entomol. Belgique, 37: 454–466). It is now reported to occur across North Africa extending as far east as Egypt (Snelling, R. R. 1992. Bull. Southern Cal. Acad. Sci., 91: 121–125). *P. teneriffana* has also been recorded from Cuba (Aguayo, C. G. 1932. Bull. Brooklyn Entomol. Soc., 27: 215–227).

Between 1989 and 1991, populations of *P. teneriffana* at Admiral Kidd Park and surrounding areas increased and the ant expanded the area it infested advancing into habitats occupied by the Argentine ant, *Linepithema humile* (Mayr). It eventually colonized about 2 ha of the 3 ha park (Martinez 1992). During this time interspecific aggression was observed between *P. teneriffana* and another entrenched exotic ant, the Argentine ant. Originally, *P. teneriffana* was the aggressor attacking and destroying Argentine ant colonies and taking over many of its nest sites (Martinez 1992). Agonistic interactions were also observed between colonies of the endemic southern fire ant, *Solenopsis xyloni* McCook and *P. teneriffana*. *Solenopsis xyloni* was observed attacking and usurping some nests of *P. teneriffana*. Interspecific hostility was also observed between the California harvester ant, *Pogonomyrmex californicus* (Buckley) and *P. teneriffana* at this location.

The early interactions between *P. teneriffana* and *L. humile* in 1990 and 1991 were not significant because the two ants essentially occupied different areas in the park with *P. teneriffana* dominant in arid areas at the south and east sides of the park, in the parking lot, and along 21st Street to Willard Street. Willard Street, 21st Street, and Santa Fe Avenue delineate an area encompassing a contiguous industrial/commercial structure which encircled an asphalt parking area in the center. No external moisture source could be located on the interior and exterior perimeters of the structure. *Linepithema humile* was well established on the north side of the park where sprinklers provided it with water.

Several events occurred at Admiral Kidd Park which adversely impacted ant populations which occurred there. In March/April 1990, employees of the Los Angeles County Agriculture Commissioner attempted to eradicate the *P. teneriffana* infestation. The Agriculture Commissioner's representatives applied chlorpyrifos, using compressed air sprayers, to *P. teneriffana* nests (R. Garrison, personal communication). This was an unsuccessful attempt at eradication because many nests were not found, and hence, they were not treated. *Pheidole teneriffana* continued to thrive in the park and its surrounding areas along 21st and Willard Streets after this eradication effort.

Between April and June 1993, a section on the north side of Admiral Kidd

Park was renovated and a 0.8 ha soccer field was established. The turf in this area was reseeded and additional sprinklers were installed making the area favorable for Argentine ants because of the continuous source of moisture. At about the same time, the children's play area on the south side, and the parking lot on the east side of the park were also renovated. Some areas of the parking lot were repaved with bricks. These habitat modifications negatively impacted populations of *P. teneriffana* which existed at the east and south sides of the park. However, both the Argentine ant and *P. teneriffana* continued to exist in the park and surrounding areas after the renovations were completed.

In November 1994, at the southwest corner of the park, Argentine ants were observed encroaching on and invading territories occupied by *P. teneriffana*. Battles between the two species continued in this area from November 1994 to about October 1995, at which time, *L. humile* succeeded in eliminating all *P. teneriffana* colonies from this area of the park. By April 1996, *P. teneriffana* was driven out of Admiral Kidd Park and its parking lot by the Argentine ant. However, nests of *P. teneriffana* continued to exist along the south side of 21st. Street and extending all the way to Willard Street. Inspections conducted by the junior author on 16 January 1997 revealed only four *P. teneriffana* nests remaining in the pavement areas between 1731 and 1807 Willard Street. On 10 February 1997, only two nests of *P. teneriffana* remained in this area. Argentine ants were observed attacking these nests and pillaging their contents. On 3 June 1997, only one *P. teneriffana* nest remained adjacent to 1741 Willard Street. An inspection made at this site on 21 August 1997 revealed that *P. teneriffana* no longer existed at this location.

On 12 September 1998, a thorough and careful survey and reconnaissance of the park, and all surrounding areas originally occupied by *P. teneriffana*, was conducted in an attempt to locate nests of this ant. We were not successful in finding any nest of *P. teneriffana*. Additionally, 66 bait points consisting of about two grams each of 30% fat ground beef were placed in many areas of the park, its parking lot, and adjacent streets where *P. teneriffana* nests and foragers had been observed in the past. One hour after placement, these bait locations were inspected and the ant species present were recorded. Sixty three of these bait placements were found to be heavily monopolized by the Argentine ant. We believe that the other three bait placements were not discovered by *L. humile* because they were placed in cracks in the concrete pavement which were exposed to direct sunlight and thus were too hot for foragers of Argentine ant to traverse.

Further surveys and inspections conducted at Admiral Kidd Park and surrounding areas on 10 and 11 October 1998 failed to locate any nest or foragers of *P. teneriffana*. We are convinced that *P. teneriffana* has been extirpated at this location.

When *P. teneriffana* was originally discovered at Admiral Kidd Park, it occupied arid areas on the south and east sides of the park. These dry areas were marginal habitats for the Argentine ant which occurred on the north side of the park which was subjected to periodic irrigation. Renovations on the north side of the park, which took place in 1993, probably contributed to a build-up of Argentine ant populations at this location.

Other environmental changes, including several wetter and warmer than normal winters, fostered an enormous build-up of Argentine ant populations at Admiral

Kidd Park and the surrounding areas which permitted *L. humile* to venture into and colonize previously marginal habitats.

Renovations at the south and east sides of the park and pesticide applications to some *P. teneriffana* nests contributed to altering the competitive advantage in favor of the Argentine ant. Based on our observations we believe that the final extirpation of the exotic ant, *P. teneriffana*, at Admiral Kidd Park and its immediate surroundings was done by the Argentine ant. This should come at no surprise to anyone as *L. humile* has been reported to displace species of *Pheidole* in Madeira (Goetsch, W. 1957. The ants. The University of Michigan Press, Ann Arbor). *Linepithema humile* has also extirpated other ant species in several areas (Haskins, C. P. & E. F. Haskins. 1965. Ecology, 46: 736–740; Crowell, K. L. 1968. Ecology, 49: 551–555; Fluker, S. S. & J. W. Beardsley. 1970. Ann. Entomol. Soc. Am., 63: 1290–1296; Erickson, J. M. 1972. Psyche, 78: 257–266; Lieberberg, L. P. et al. 1975. Ecology, 56: 473–478; Ward, P. S. 1987. Hilgardia, 55: 1–16).

We also observed that other ant species: *Solenopsis xyloni* McCook, *P. californicus* (Buckley), *Dorymyrmex insanus* (Buckley), *Dorymyrmex bicolor* Wheeler, *Tapinoma sessile* (Say), *Formica francoeuri* Bolton, *Monomorium ergatogyna* Wheeler, and *Cardiocondyla ectopia* Snelling, existed at Admiral Kidd Park at the time *P. teneriffana* was discovered (Martinez 1992). Surveys conducted on 12 September 1998 and on 10 and 11 October 1998 found only two of the above species in the park and its immediate surroundings. A single *P. californicus* nest was found on a section of 21st. Street that turns at right angles and connects to Willard Street. Several *C. ectopia* nests currently exist in the park, along its borders, and in the parking lot at the east side. This ant possesses a repellent chemical which it frequently uses when threatened by the Argentine ant (Gulmahamad, H. 1997. Pan-Pacific Entomol., 73: 21–27).

We believe that the Argentine ant is responsible for the reduction of formicid biodiversity in Admiral Kidd Park and its immediate surroundings. We think that changing environmental conditions in the future will periodically cause the Argentine ant to abandon/recolonize marginal habitats in and around the Admiral Kidd Park and this will result in cycles of recolonization and displacement of endemic ant species in the park and its surrounding areas.

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